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## Introduction

- Fire was likely important to the establishment and maintenance of forested peatlands (Heinselman 1963, 1973).
- Specifically, fire has been shown over time to maintain species diversity and ecosystem function (Benscoter et al. 2015).
- However, little is known about historic fire regimes in forested peatlands across the upper Great Lakes region.

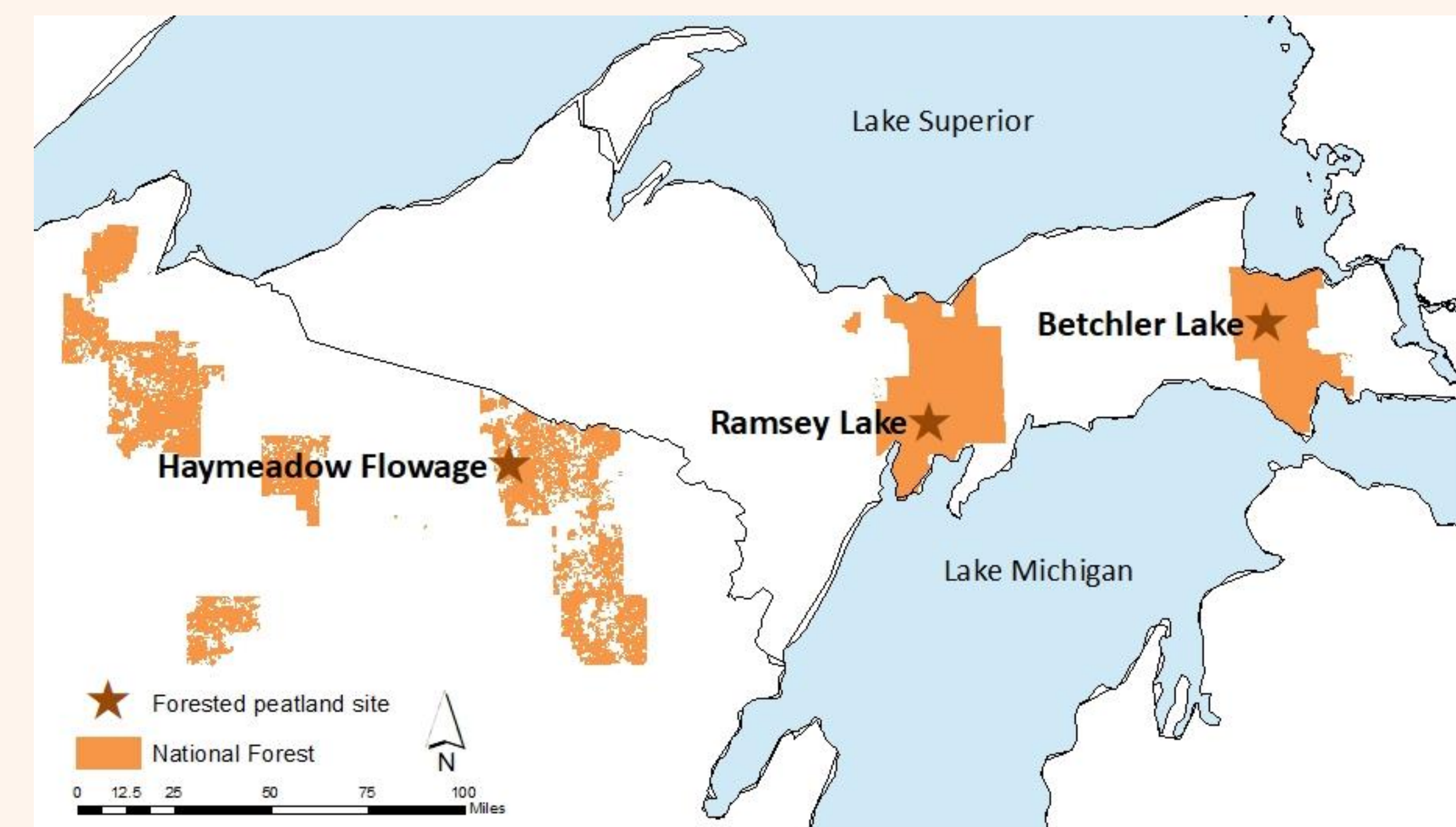
## Goal

To determine historic fire regimes in forested peatlands throughout the upper Great Lakes region.

## Methods

### Study Area

Our study area includes three forested peatland sites located across the upper peninsula of Michigan and northern Wisconsin (**Fig. 1**).

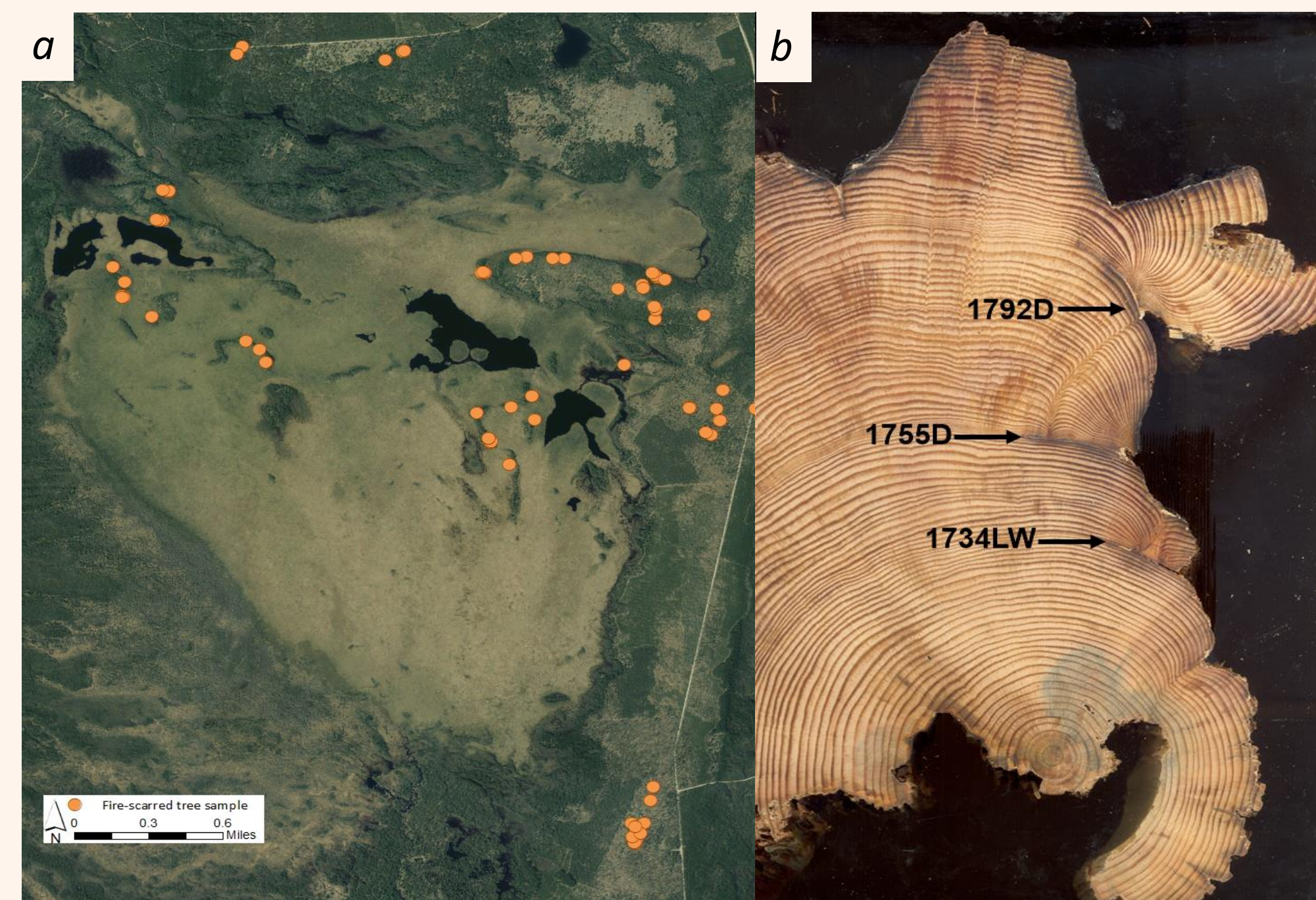


**Fig. 1** Map of the overall extent of sample sites across the upper Great Lakes region.

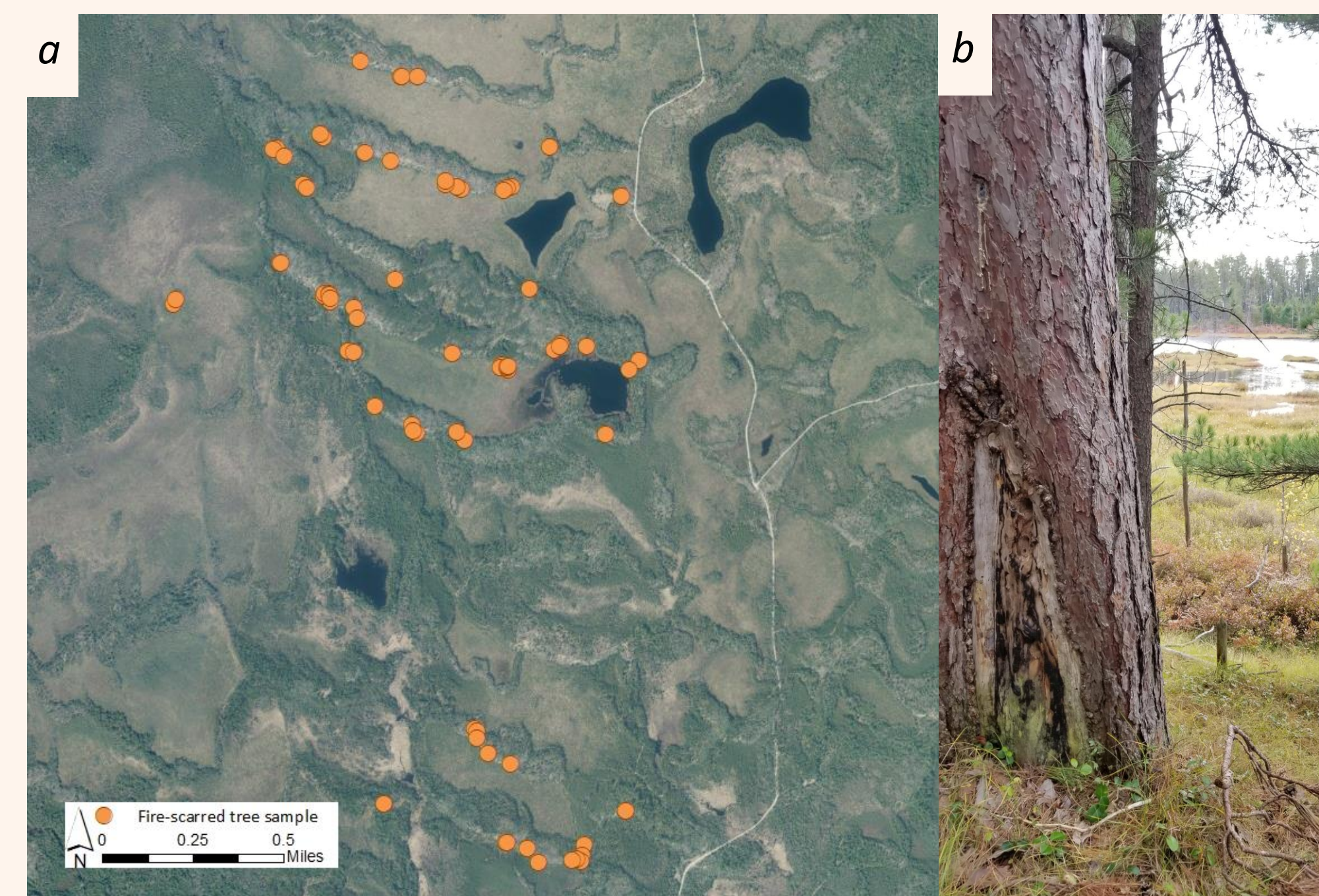
### Methods

- We selected peatlands with mixed conifer stands within and around them.
- We sampled pine stumps from the 1800s logging cutover and partial sections of fire-scarred living trees.
- We cross-dated samples and assigned dates to all fire scars.
- We are analyzing temporal and spatial dynamics of fire within peatland systems and surrounding landscapes.

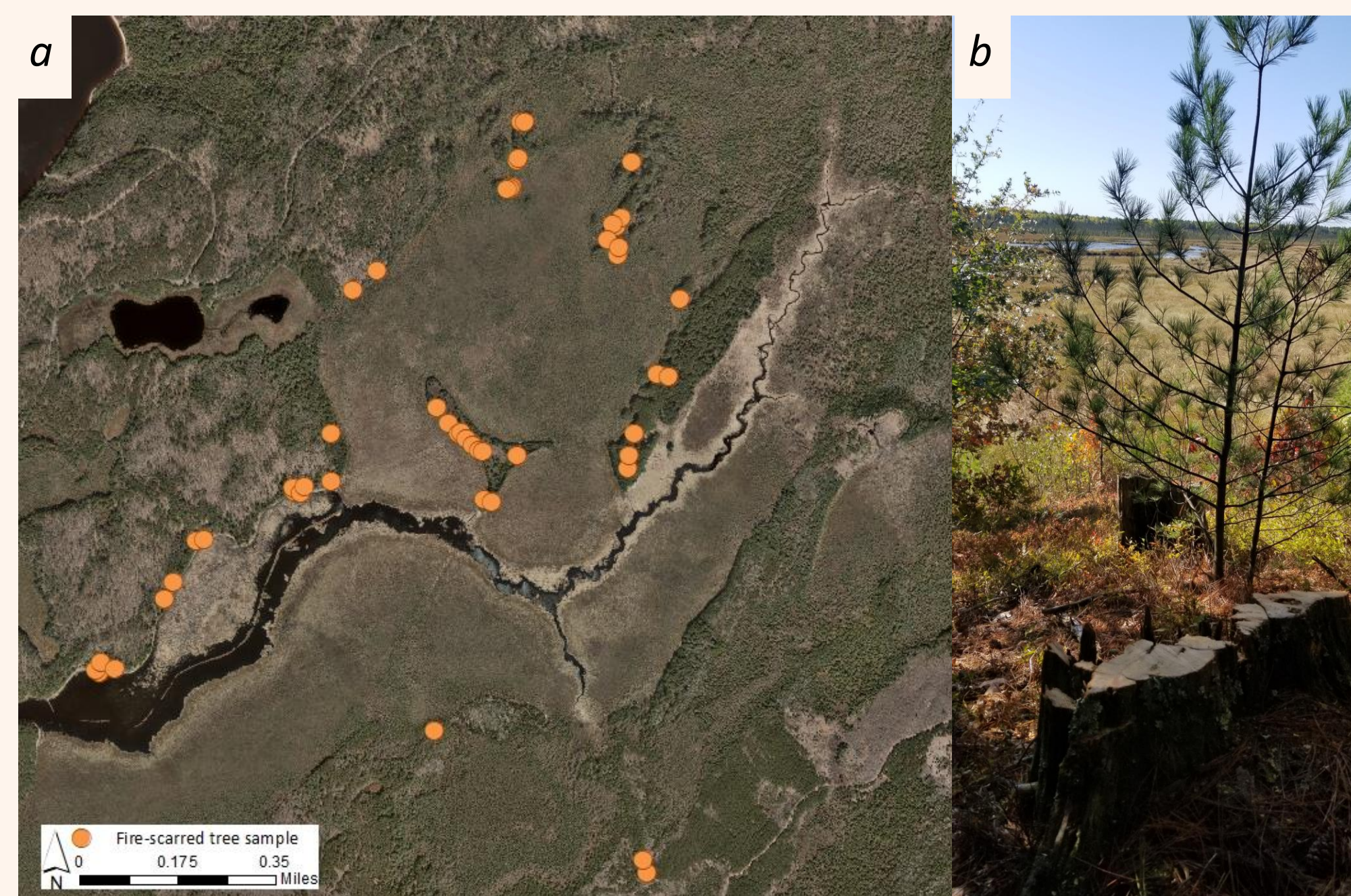
## Results: Fire-scarred samples



**Fig. 2** Samples ( $n=95$ ) collected in 2018 at Betchler Lake (a) and cross-dated sample with fire year and seasonality indicated (b).



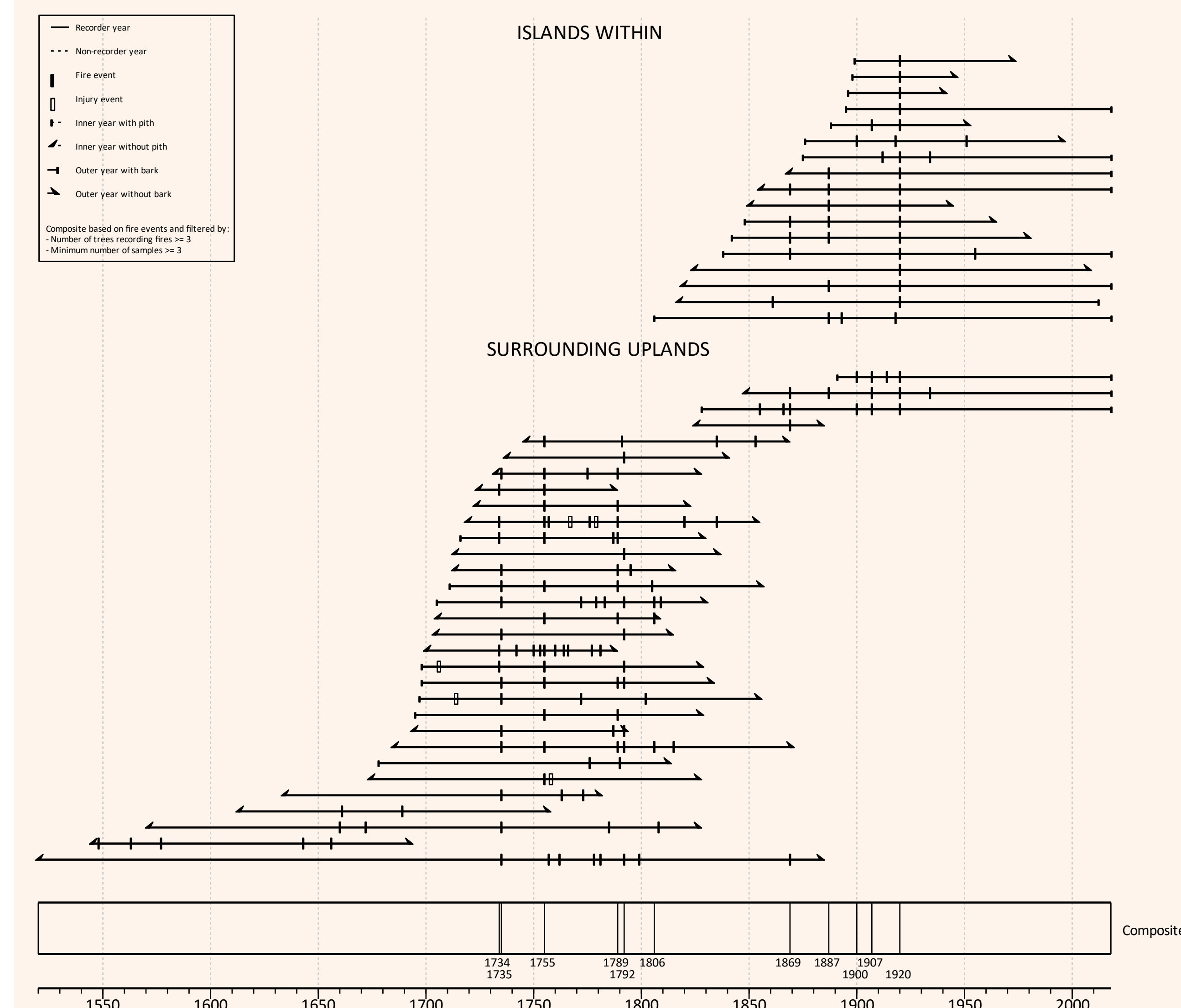
**Fig. 3** Samples ( $n=78$ ) collected in 2019 at Ramsey Lake (a) and a living fire-scarred *Pinus resinosa* before sampling (b).



**Fig. 4** Samples ( $n=54$ ) collected in 2019 at Haymeadow Flowage (a) and an image of a sampled fire-scarred stump at the edge of the peatland (b).

## Results: Betchler Lake chronology

- We reconstructed a 498-year chronology (1520-2018, **Fig. 5**).
- Mean fire return interval was 11 years (min=1, max=34).
- Synchronous fire years included 1734, 1735, 1755, 1789, 1792, 1806, 1869, 1887, 1900, 1907, and 1920 (**Fig. 5**).
- We determined seasonality for 59.5% of our fire scars. Of these, 82.4% were dormant (D) fires and 17.6% were latewood (LW) fires.



**Fig. 5** Fire history for the Betchler Lake site in the Hiawatha National Forest arranged by location in the peatland. Each horizontal line is a sample (either a remnant stump or living tree cross-section).

## Discussion and conclusions

- The upper Great Lakes region contains >14 million acres of forested peatlands and some of the highest rates of wetland loss in the U.S. (Dahl 2011).
- Fire was frequent and integral to historic disturbance regimes of forested peatlands.
- Back-to-back fire years (e.g. 1734LW and 1735D) suggest fires burned into the fall/winter months when trees went into dormancy.
- Short-term seasonal droughts could influence fire regimes in forested peatlands.



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